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PENSOFT

New records of four tree species in the state of Paraná, southern Brazil: Canellaceae, Lauraceae, Melastomataceae, and Myristicaceae

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Abstract
The teams of Escola de Florestas de Curitiba (EFC) and Museu Botânico Municipal (MBM) herbaria, Curitiba, Brazil, made field expeditions between the years 2017 and 2019 to increase the knowledge of the flora of Paraná state, southern Brazil. Four new records of tree species are reported: *Cinnamodendron occhionianum* F.Barros & J.Salazar (Canellaceae), *Cryptocarya botelhensis* P.L.R.Moraes (Lauraceae), *Henriettea glabra* (Vell.) Penneys, Michelang., Judd et Almeda (Melastomataceae) and *Virola gardneri* (A.DC.) Warb. (Myristicaceae). The genus *Henriettea* is recorded from the state of Paraná for the first time. All four species occur in the Atlantic Rainforest of Brazil.

Keywords
Brazilian Flora, distribution, evergreen tropical forest, new occurrences, taxonomy

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Introduction

The Brazilian Atlantic Forest shows a high richness of plant species and is considered a hotspot of diversity and endemism. Unfortunately, this forest has lost 92.5% of its original area (Myers et al. 2000). In Paraná state, 87% of its natural vegetation has been lost (Fundação SOS Mata Atlântica and INPE 2017). Nonetheless, the eastern portion of the state still presents several remnants of the original Atlantic Forest, some of them protected in national and state parks, as well as in private reserves. Despite being one of the most preserved areas of the Atlantic Forest, northeastern Paraná remains as one of the lesser known regions in the state in terms of its biodiversity. Recent field expeditions to the municipality of Guaraqueçaba have found many species unrecorded from Paraná, with most species known from the states of São Paulo and Rio de Janeiro.

Kaehler et al. (2014) estimated about 6,430 species of native vascular plants in Paraná, including 5,990 angiosperms, 436 ferns and lycophytes, and four gymnosperms. However, this number has gradually been increased as new records are made (Meyer and Goldenberg 2014, 2016; Lozano et al. 2016, 2018; Brotto et al. 2019; Souza et al. 2019; Pereira et al. 2021).

Eastern Paraná harbors the highest diversity of trees in the state, with at least 469 species (Scheer and Blum 2011). The high richness and endemism of Lauraceae and Myrtaceae is noteworthy (Murray-Smith et al. 2008; Brotto et al. 2019).

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In this paper, we present new records for four species of trees, with each species belonging to a different family.

Canellaceae Mart. is a woody tropical and subtropical family of trees with 21 species in five genera (Zanoni 2004; Salazar and Nixon 2008; Barros and Salazar 2009; Salazar et al. 2020). The genus *Cinnamodendron* Endl. is the only representative of this family in Brazil has six species, all occurring in the Atlantic Rainforest (Salazar et al. 2020; Gonzaga and Lirio 2020). Among species of this genus, *Cinnamodendron occhionianum* F.Barros & J.Salazar (Barros and Salazar 2009) was described from São Paulo and without records outside this state (INCT 2019).

Lauraceae Juss. includes about 50 genera with 2,500–3,500 species, mostly from tropical areas, and is well represented in the Americas, tropical Asia, Australia, and Madagascar (Rohwer 1993; Chanderbali et al. 2001). Lauraceae are among the richest woody families in the Neotropical forests, where they occupy mainly lowlands or intermediate altitudes and grown on poor soils (Gentry 1988). In Brazil, 467 species are recorded, of which 211 are in the Atlantic Rainforest (Quinet et al. 2020), and until now, 76 in the state of Paraná (Brotto et al. 2019). The genus *Cryptocarya* R.Br. comprises 13 species in Brazil, with five recorded from the state of Paraná (Brotto et al. 2019; Quinet et al. 2020).

Melastomataceae Juss. is a tropical and subtropical family with approximately 5,750 species in 177 genera (Michelangeli et al. 2020). In Brazil, the family comprises 69 genera and 1,436 species, of which 929 species are endemic (Goldenberg et al. 2020). Melastomataceae is widely distributed throughout the country, especially in the Amazon Rainforest, Central Brazilian Savannah, and Atlantic Rainforest domains (Goldenberg et al. 2012). *Henriettea* DC., today circumscribed within the tribe Henrietteeae, is a genus of shrubs or trees with 25 species distributed in the Neotropics (Penneys et al. 2010). In Brazil, the genus comprises 19 species, of which two species are endemic. The Amazon Rainforest shows the highest species richness, with 17 species, followed by the Atlantic Rainforest with three species, the Savanna (Cerrado) with two species, and Dry Savanna (Caatinga) with one species (Brito 2020).

Myristicaceae R.Br. includes about 18 genera and 400 species distributed in tropical and subtropical rainforests. In the Neotropics, the distribution center of the family is located in the western Amazon basin (Rodrigues 2002). Myristicaceae is among the woody families that most contribute to species richness in Neotropical lowland forests (Gentry 1988). In Brazil, 65 species are recognized, but only four are distributed in the Atlantic Rainforest (Rodrigues 2020), and until now, only one species has been recorded from Paraná (Hatschbach 1972; Rodrigues 2014). The genus *Virola* Aubl. comprises 35 species in Brazil and one in Paraná (Oliveira 2020).

Methods

Field expeditions to increase the knowledge of the flora of Paraná were made between 2017 and 2019 as part of the herbaria programs of Escola de Florestas de Curitiba (EFC) and Museu Botânico Municipal (MBM). These expeditions focused on poorly sampled places of Guaraqueçaba, in the coastal region of Paraná, which is covered by the Atlantic Rainforest *sensu stricto* (Oliveira-Filho and Fontes 2000; Roderjan et al. 2002). Places surveyed included varied from sea-level plains (mangroves and restingas) to montane cloud forests up to 1,500 m in altitude. The climate classification is Cfa (subtropical climate with hot summer) according to the Köppen climate classification (Alvares et al. 2013).

Comparisons of newly collected specimens with specimens deposited in the MBM Herbarium were made and identifications were confirmed by consultation the taxonomic literature for each group: Rodrigues (1980, 2002), Moraes (2007), Barros and Salazar (2009), Martins (2009), Goldenberg et al. (2016), Brito (2020), Gonzaga and Lirio (2020), Oliveira (2020), Quinet et al. (2020). We also used SpeciesLink (INCT 2019) and Reflora (Reflora – Herbário Virtual 2020), two online platforms which compile data from most of the herbaria in Brazil. Descriptions were based on the examined material, and figures were made from specimens collected during field expeditions. The occurrence points on the maps correspond to specimens seen in SpeciesLink and Reflora. Besides MBM, we also studied specimens from the following herbaria: ALCB, CEN, CEPEC, CESJ, CNMT, CVRD, EAC, ESA, FUEL, FURB, HAS, HCF, HRCB, HUEFS, HUFU, IAC, IAN, ICN, INPA, IPA, JOI, K, MAC, MO, NY, P, PMSP, RB, RFA, SAMES, SP, SPF, SPSF, UB, UEC, UFRN, UPCB, VIES (acronyms according to Thiers 2020). The vouchers were deposited in EFC and MBM herbaria, and duplicates were sent to others herbariums: ALCB, BHCB, CESJ, FURB, HCF, HRCB, JOI, NY, RB, SP, SPSF, VIES.

Results

Four tree species are recognized in the state of Paraná: *Cryptocarya botelhensis* P.L.R. Moraes of the family Lauraceae, *Cinnamodendron occhionianum* F. Barros & J. Salazar of the family Canellaceae, *Henriettea glabra* (Vell.) Penneys, Michelang., Judd & Almeda of the family Melastomataceae, and *Virola gardneri* (A.DC.) Warb. of the family Myristicaceae.

***Cryptocarya botelhensis* P.L.R.Moraes**, ABC Taxa 3: 51. 2007.

Figure 1. Iconography: Moraes (2007).

New records. BRAZIL – **Paraná** • Guaraqueçaba, Serra Gigante; 25°09′19.8″S, 048°10′28″W; 830 m elev.; 12. XII.2018; M.L. Brotto and L.F. Ribeiro 3214 leg.; MBM 417501.

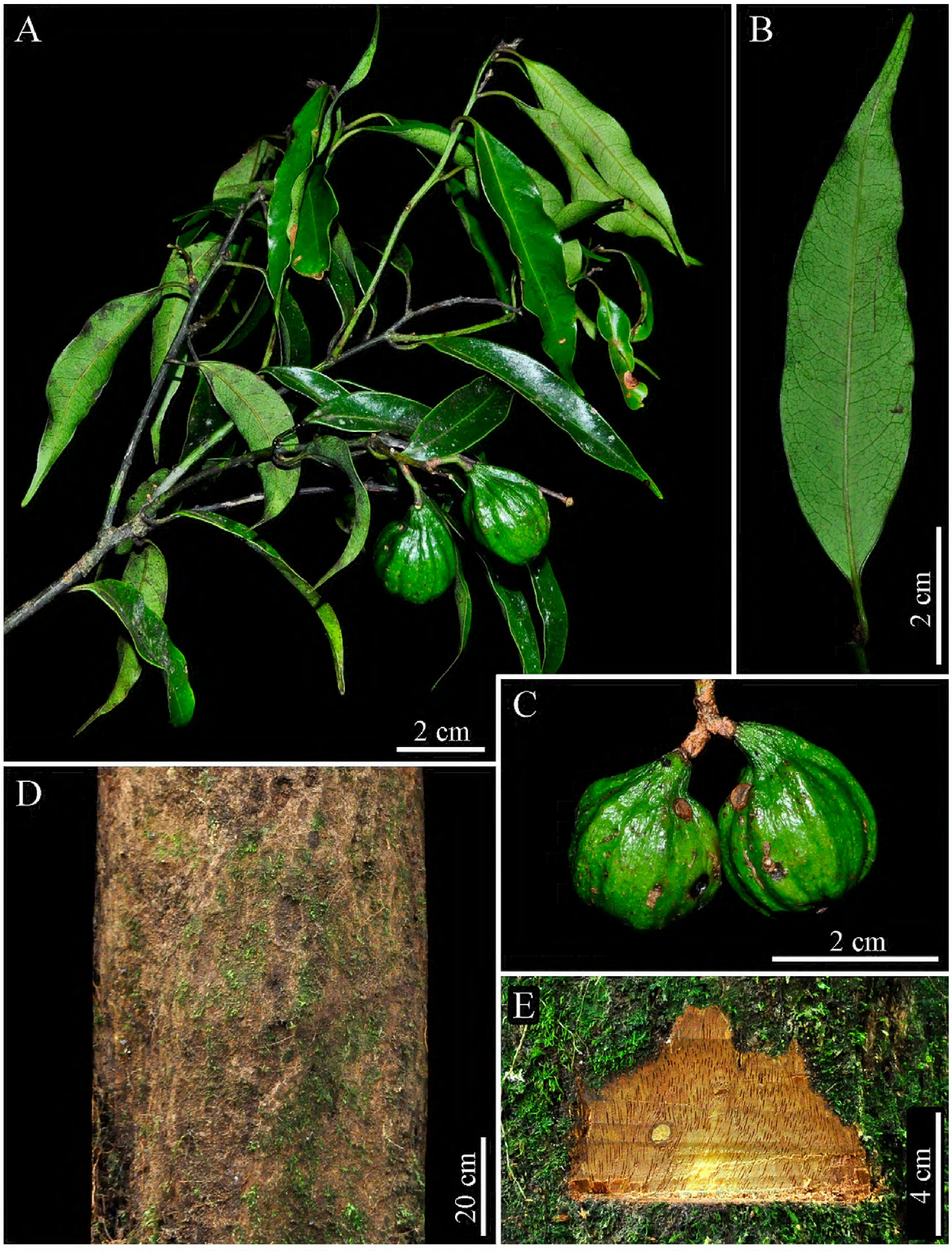

Figure 1. *Cryptocarya botelhensis* P.L.R.Moraes. **A.** Branch with immature fruits. **B.** Abaxial leaf surface. **C.** Immature fruits in the final stage of development. **D.** Bark appearance. **E.** Slash appearance.

Identification. Trees, up to 25 m tall. Bark light brown, dimpled by scars of the scaled-off old bark; slash yellowish-brown, tangential section marked with dark-brown spots. Branches cylindrical, with lenticels. Leaves simple, alternate, spiral, entire, without stipule; petioles 0.8–1.0 cm long, canaliculate, glabrous; lamina 5.5–9.0 × 1.5–2.3 cm, chartaceous, glabrous, mostly narrow lanceolate or narrow elliptical, apex caudate to slightly caudate, base cuneate, adaxial surface glabrous, venation flat or slightly raised, abaxial surface with inconspicuous papillae, venation slightly raised, secondary veins 9 or 10 pairs, angles with primary vein 50–70°, laxly reticulate on both surfaces, venation pattern brochidodromous, domatia absent. Inflorescences 1.8–4.0 cm long, panicles in the axils of distal leaves, often subterminal, sparsely pubescent to glabrescent. Flowers bisexual, glabrescent, ca. 4 mm long, 2.8 mm in diameter; pedicel ca. 0.4 mm long; tube urceolate ca. 1.5 mm long; tepals subequal, 2.3 mm long, 1.0–1.2 mm broad, elliptical, pubescent within; stamens included, 9 fertile stamens, 2 locular; stamens of whorls I and II introrse, ca. 1.6 mm long, anthers ovate, filaments slender as long as anthers, pubescent, stamens of whorl III lateral, ca. 2.1 mm long, anthers narrow ovate, filaments rather slender, longer than anthers, pilose, glands subglobose long-pedicelled, staminodes of whorl IV triangular-cordate, gynoecium immersed in the tube, glabrous, ca. 1.8 mm long, ovary ellipsoid, ca. 0.6 mm long, discoid stigma. Fruits 2.8 × 1.8 cm, pyriform, ellipsoid or ovoid, deeply ribbed.

Until now, 76 species of Lauraceae have been recorded for Paraná (Brotto et al. 2019). Among the five species of *Cryptocarya*, *C. aschersoniana* Mez, *C. mandioccana*

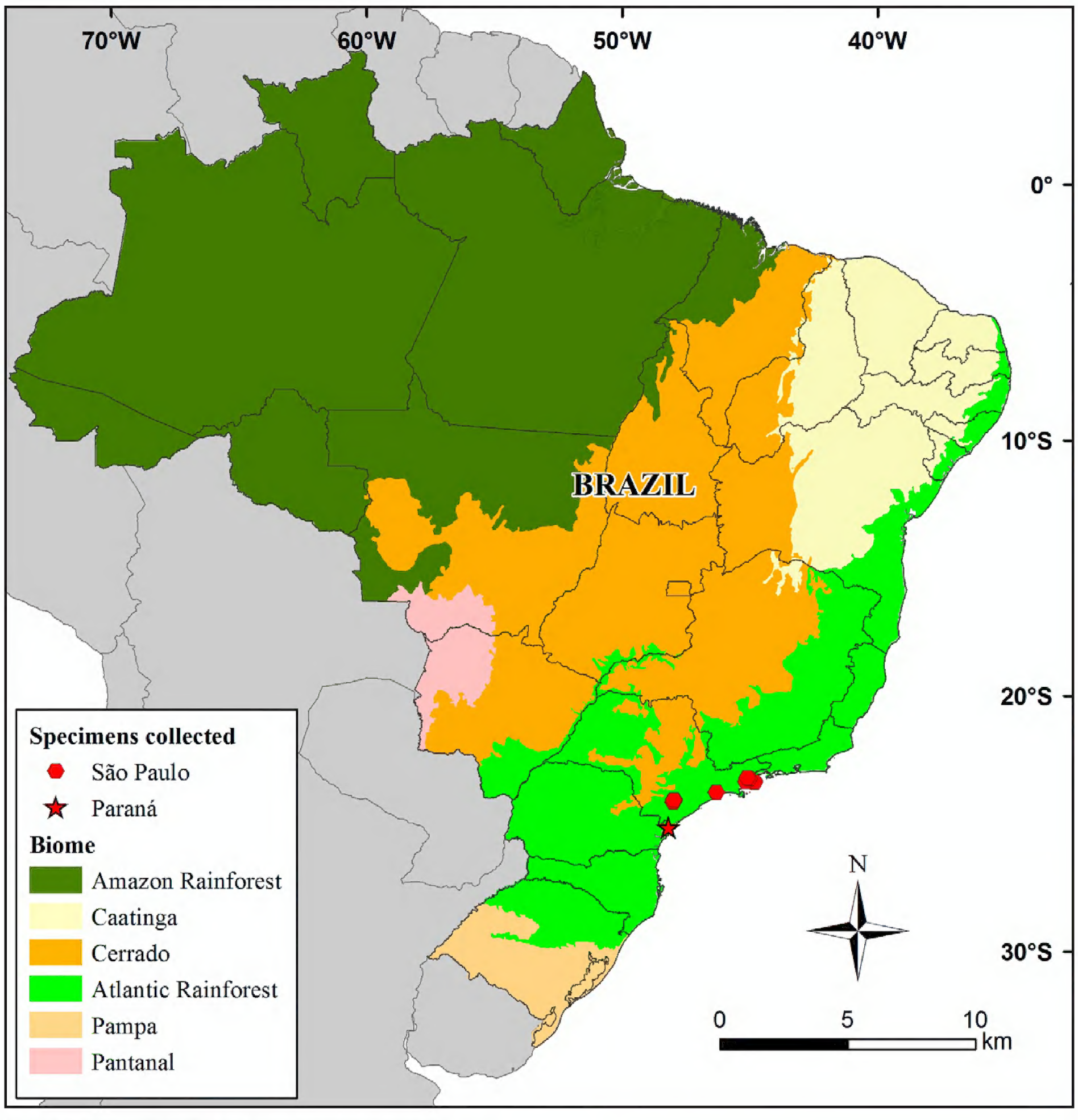

Figure 2. Distribution of *Cryptocarya botelhensis* P.L.R.Moraes.

Meisn., *C. saligna* Mez, and *C. subcorymbosa* Mez which also occur in the Atlantic Rainforest *sensu stricto* of the state (Brotto et al. 2019), *C. botelhensis* differs in having a narrower blade, length × width ratio of 4–5×1 (vs. 1.3–4.0 × 1 of other species), a caudate to slightly caudate apex (vs. acute or acuminate apex), and a conspicuously ribbed fresh fruit. *Cryptocarya botelhensis* also differs by the lax tertiary venation, whereas the other species have denser tertiary venation. *Cryptocarya saligna* differs by the acuminate or acute short apex and elliptical leaf, and by the exserted stamens and/or gynoecium. The description of inflorescences and flowers of *C. botelhensis* was based on isotype MBM 339686.

Additional examined specimens. BRAZIL – **São Paulo** • São Miguel Arcanjo, Parque Estadual Carlos Botelho; 24°03′45.8″S, 047°57′46.2″W; 09.I.2001; P.L.R. de Moraes 2323 leg.; *isotypus*-MBM 339686 • São Luiz do Paraitinga, Parque Estadual da Serra do Mar, Núcleo Santa Virgínia, trilha Salto Grande; 23°20′35.4″S, 045°09′18.3″W; 09.VIII.2001; P.L.R. de Moraes 2481 leg.; *paratypus*-MBM 279214 • Ibid., trilha Ponte de Pedra; 09.VIII.2001; P.L.R. de Moraes 2482 leg.; *paratypus*-MBM 339684.

Distribution. The species was previously known from Estação Biológica de Paranapiacaba, at Parque Estadual da Serra do Mar, Núcleo Cunha-Indaiá, and Parque Estadual Carlos Botelho, all in São Paulo state (Moraes 2007). In Paraná, we collected this species in the Serra Gigante on the northern coast (Fig. 2).

Phenology. Moraes (2007) mentioned flower buds in December, flowers at anthesis in January and June, immature fruits in March and August, and mature fruits in January, February, April, and June. We observed almost mature fruits in December.

***Cinnamodendron occhionianum* F.Barros & J.Salazar**, Novon 19(1): 11, 2009.

Figure 3. Iconography: (Barros and Salazar 2009; Salazar et al. 2020).

New records. BRAZIL – **Paraná** • Adrianópolis, Parque Estadual das Lauráceas; 24°51′26″S, 048°43′04″W; 13.XI.2007; J.M. Silva and J. Cordeiro 6165 leg.; MBM 338809 • Antonina, Cachoeira; 11.IX.1975 G. Hatschbach 37043 leg.; MBM 46660 • Ibid., Caixa D'Água; 13.III.1973; G. Hatschbach 31769 leg.; MBM 25179 • Ibid., Rio Lagoa Vermelha; 26.VIII.1981; G. Hatschbach 43967 leg.; MBM 70831 • Ibid., Serrinha; 25°18′52″S, 048°38′48″W; 29.VIII.1972; G. Hatschbach 30273 leg.; MBM 24036 • Guaraqueçaba, Estrada do correntão entre os Rios Açungui e Serra Negra; 25°10′26″S, 048°25′37″W; 15.XII.1994; S.R. Ziller 640 leg.; MBM 339863 • Ibid., Rio do Cedro; 11.IV.1968; G. Hatschbach and C. Koczicki 19010 leg.; MBM 11261 • Ibid., RPPN Salto Morato; 25°09′36″S, 048°19′08″W; 400 m elev.; 08.VII.2018; R.R. Völtz, M.L. Brotto and A. Tres 1664 leg.; MBM 413957.

Identification. Canopy to understory tree up to 18 m tall. Bark pale yellow, fissured; fissures shallow, short, wavy, reticulate, ridges flattened, lenticellate, lenticels round, small, numerous, solitary, soft; slash pinkish-white, tangential section with longitudinal streaks. Stems rounded, herbaceous and green at first, becoming woody and pale yellow when older, glabrous. Leaves simple, alternate, entire, stipules absent; petiole 4.2–8.5 cm long, canaliculate, glabrous; leaf blade 4.0–9.0 × 2.5–4.5 cm, chartaceous, glabrous, broadly elliptic or elliptic, apex obtuse or acuminate, base obtuse, acute or slightly attenuate, venation brochidodromous (festooned), midrib recessed on the adaxial surface, raised on the abaxial surface, secondaries veins 6–10 pairs, flat or slightly raised on the adaxial surface, slightly raised on the abaxial surface, tertiary veins irregularly reticulate. Inflorescences fasciculate, 1–4 flowers. Peduncle glabrous, bracts and bracteoles subcoriaceous, caducous, imbricate, slightly ciliate at the margin and glandular-punctate; pedicel 2–5 mm long, glabrous; bracteoles glabrous, imbricate, glandular-punctate; flowers small, pentamerous; sepals 3, green, suborbiculate to orbiculate, 2.0–3.0 × 3.0–4.0 mm, margin entire to slightly ciliolate; petals 10, dark purple, free, in two series of 5, imbricate, fleshy, glandular-punctate, margin slightly ciliolate, the outer petals larger and thicker, 5.0–6.5 × 3.3–5.0 mm, obovate, the internal petals smaller and membranaceous, 3.0–4.0 × 1.2–2.0 mm, obovate to spatulate; stamens 10, fused into a staminal tube and monadelphous, 4.0–5.0 mm, anthers 1.0–1.8 mm, inequilateral, apically truncate; ovary 2-locular, cylindrical, 4.7–6.0 mm long, stigma capitate, papillate, bilobate. Fruit berry, stipitate, 1.5–1.8 × 1.1–1.3 mm, globose, greenish when immature, becoming dark purple at maturity; seeds 3 or 4, embedded in a gelatinous pulp.

Cinnamodendron axillare Endl. ex Walp. and *C. dinisii* Schwacke were the only species recognized from Paraná by Kaehler (2014). *Cinnamodendron occhinionianum* differs from *C. axillare* by the fasciculate inflorescence with 1–4 flowers (vs. raceme inflorescence with 3–8 flowers in *C. axillare*), the dark purple petals (vs. whitish cream petals in *C. axillare*) and by the dark purple berry (vs. orange and reddish berry in *C. axillare*). This species shares similar leaf morphology and petal colors with *C. dinisii*, but it differs from the latter by the corolla with 10 petals (vs. corolla with 6 petals in *C. dinisii*), the androecium with 10 stamens (vs. androecium with 9 stamens in *C. dinisii*), and by the 2-locular ovary (vs. 3-locular ovary in *C. dinisii*) (Barros and Salazar 2009; Gonzaga and Lirio 2020).

Distribution. *Cinnamodendron occhionianum* is endemic to Brazil, with a few records from the Perequê river in the Cardoso Island, São Paulo state, at 120–200 m elevation (Barros and Salazar 2009). In Paraná, we collected this species in the mountainous region in northern, coastal Paraná, at 400 m elevation along the hillsides of the Engenho river. Since this collection, we examined old undetermined samples and are able to confirm the species. The old collections expand the occurrence of *C. occhionianum* to Adrianópolis, Antonina,

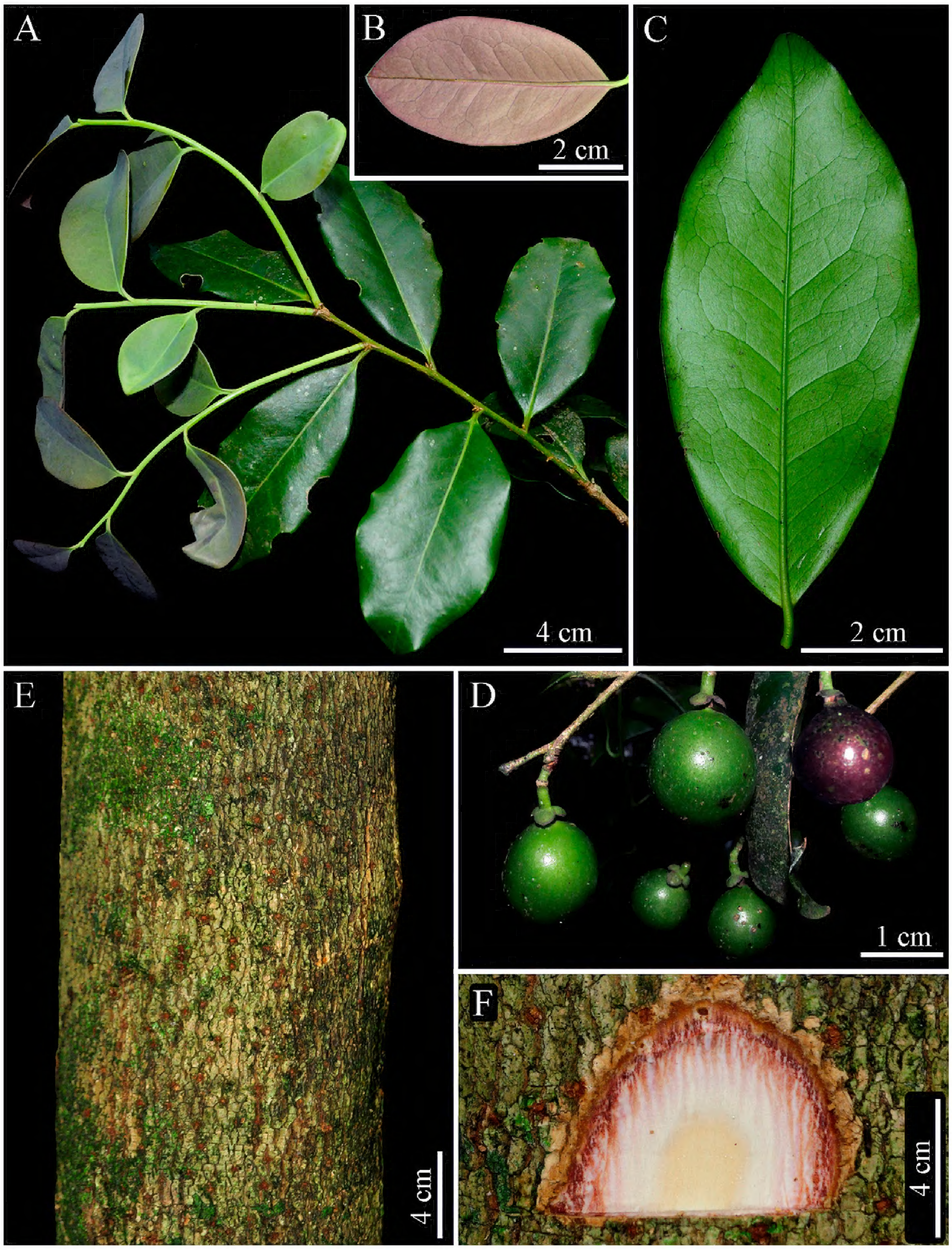

Figure 3. *Cinnamodendron occhionianum* F.Barros & J.Salazar. **A.** Branch with young and adult leaves. **B.** Abaxial surface of young leaf. **C.** Abaxial surface of adult leaf. **D.** Branch with immature and mature fruits. **E.** Bark appearance. **F.** Slash appearance.

and Guaraqueçaba, reaching elevations up to 900 m. Although Cardoso Island is about 40–70 km away from the new occurrences of *C. occhionianum*, these new records expand the geographical distribution of this rare species further south and west (Fig. 4).

Phenology. Collected with flowers in August–September and with fruits in November–December (Barros and Salazar 2009). In Paraná, we collected this species with flowers in August–September and with fruits in March–December.

***Henriettea glabra* (Vell.) Penneys, Michelang., Judd & Almeda**, Systematic Botany 35(4): 797. 2010.
Figure 5. Iconography: (Martins 2009).

New records. BRAZIL – **Paraná** • Guaraqueçaba, RPPN Salto Morato; 25°09′36″S, 048°18′16″W; 20.VIII.2013; R. Goldenberg et al. 1667 leg.; MBM 384785 • Ibid.; 25°10′24″S, 048°18′05″W; 100 m elev.; 04.IV.2017; R.R. Völtz, M.L. Brotto and F.F. Pajewski 1272 leg.; EFC 15790, MBM 409690 • Ibid.; 25°10′39″S, 048°18′09″W; 90 m elev.; 09.I.2018; R.R. Völtz 1470 leg.; UPCB • Ibid.; 25°10′41″S, 048°18′12″W; 95 m elev.; 2.II.2017; R.R. Völtz 1590 leg.; MBM 413909 • Matinhos; Estrada para comunidade Paranti; 25°46′16″S, 048°35′51″W; 95 m elev.; 23.V.2018; R.R. Völtz and M.L. Brotto 1569 leg.; MBM 413888, UPCB 413888.

Identification. Understory trees 6–17 m tall. Bark gray, fissured; fissures deep, short, V-shaped, reticulate, ridges flattened or rounded, ring-grooves distributed from the tree base up to the crown; slash pinkish-white at first, becoming red within a few minutes, tangential section with longitudinal streaks. Stems subquadrangulate at first,

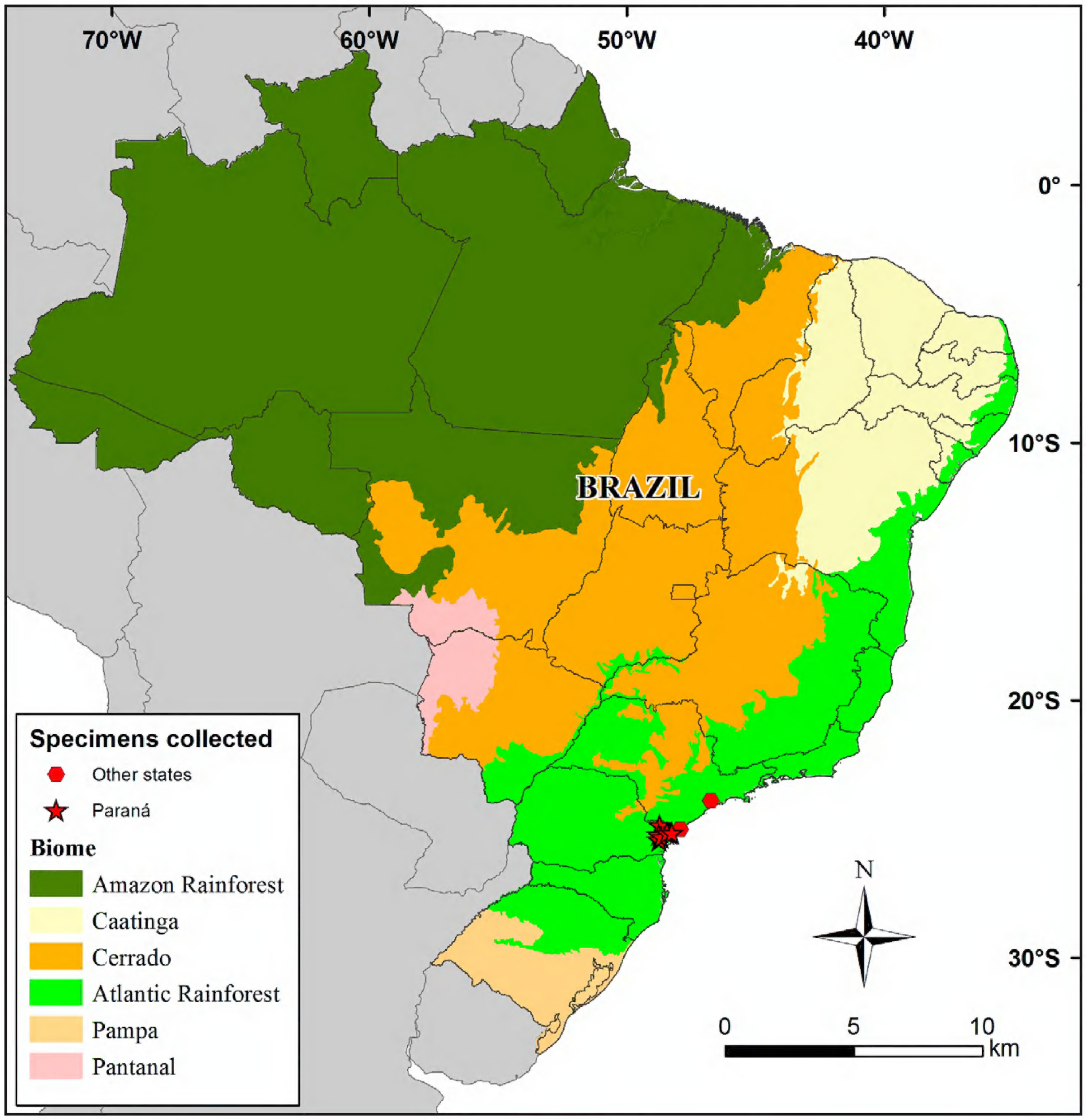

Figure 4. Distribution of *Cinnamodendron occhionianum* F.Barros & J.Salazar.

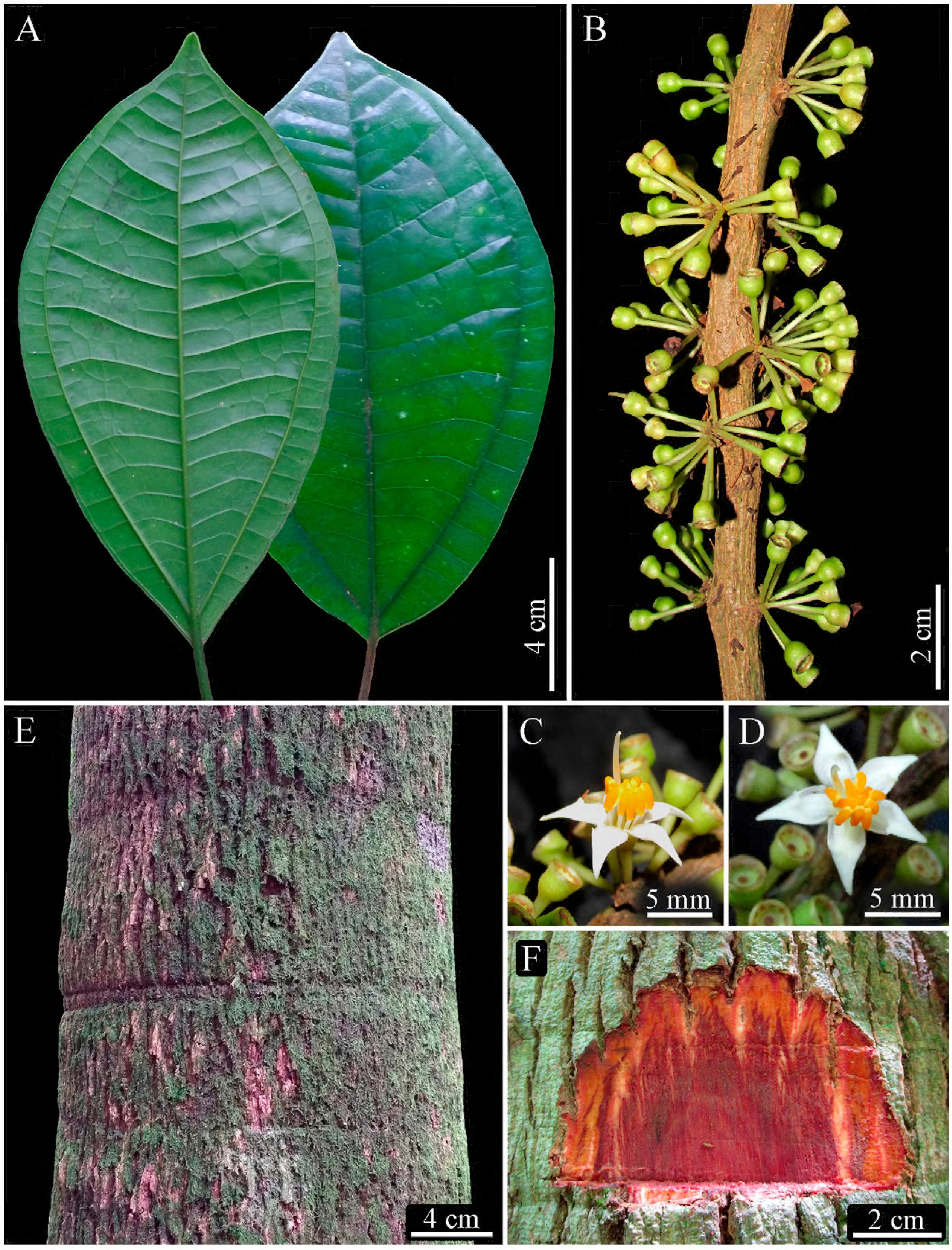

Figure 5. *Henriettea glabra* (Vell.) Penneys, Michelang., Judd et Almeda. **A.** Abaxial and adaxial leaf surfaces. **B.** Branch with immature fruits in the initial stage of development. **C.** Flower. **D.** Flower. **E.** Bark appearance. **F.** Slash appearance.

becoming rounded when older, nodose, glabrous. Leaves simple, opposite, decussate, entire, stipules absent; petiole 1.5–3.2 cm long, canaliculate, glabrous; leaf blade 9.0–17.0 × 5.0–9.5 cm, subcoriaceous, glabrous, oblong or elliptic, apex acute or acuminate, base acute, venation acrodromous, 3 veins, suprabasal, primary veins slightly raised but recessed on the adaxial surface, raised on the abaxial surface, interior secondaries veins 12–18 pairs, slightly recessed on the adaxial surface, raised on the abaxial surface, minor secondary course simple brochidodromous, tertiary veins regular reticulate. Inflorescences ramiflorous, fasciculate, 5–17 flowers. Flowers 5-merous; pedicel ca. 1 cm long, glabrous; bracteole absent; hypanthium ca. 3 mm long, cyathiform, glabrescent or glabrous; external calyx lobes inconspicuous, internal calyx lobes truncate; petals white, triangulate, 5 mm long; stamens 10, isomorphic, filaments ca. 2.5 mm long, anthers yellow, ca. 2.5 mm long, apex rounded, opening by one apical pore; ovary 5-locular, style ca. 5.5 mm long. Fruit baccate, greenish when immature, becoming yellowish to blackish at maturity, ca. 4.5 mm long.

These are the first records of *Henriettea glabra* from Paraná and the first records of the genus as well. *Henriettea* differs from other genera of the Melastomataceae in the Atlantic Forest by having a berry fruit and fasciculate and ramiflorous inflorescence. *Mouriri*, *Pleiochiton*, *Ossaea*, *Leandra, Clidemia*, and *Miconia* also have berry fruits. *Henriettea* differs from *Mouriri* by acrodromous venation and stamens without gland on the connective; from *Pleiochiton* by the arboreal habit; and from *Ossaea*, *Leandra*, *Clidemia*, and *Miconia* by the fasciculate and ramiflorous inflorescence. While *Ossaea* can

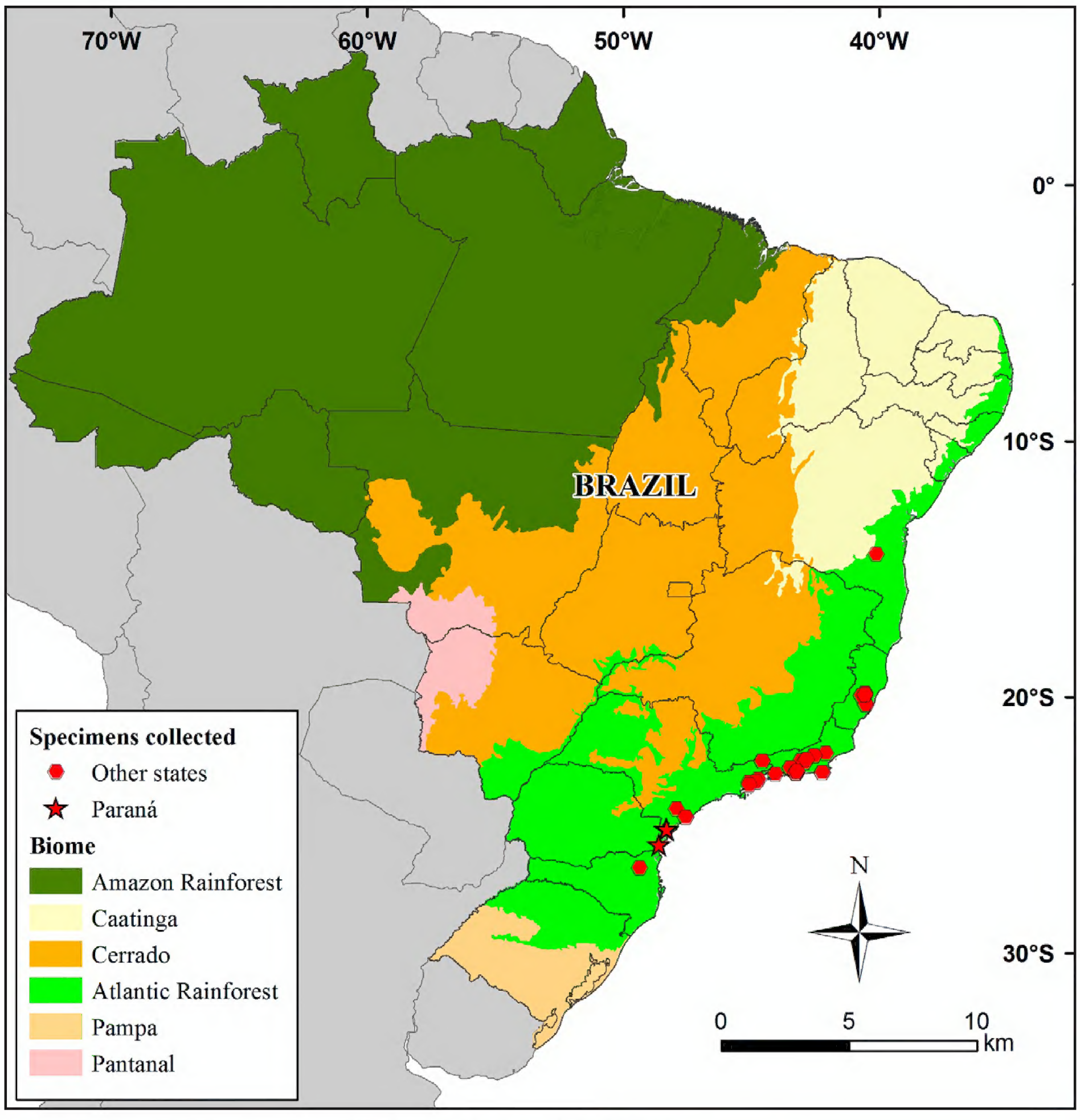

Figure 6. Distribution of *Henriettea glabra* (Vell.) Penneys, Michelang., Judd et Almeda.

have ramiflorous inflorescence, it is never fasciculate, and *Henriettea* has an arboreal habit, whereas most species of *Ossaea* are subshrubs, shrubs, and treelets (Goldenberg et al. 2016).

Additional examined specimens. BRAZIL – **Rio de Janeiro** • Rio de Janeiro, Jardim Botânico, mata do horto; 22°57′56″S, 043°14′44″W; 02.IV.2013; J. Monteiro 468 leg.; UPCB 88124 – **Espírito Santo** • Cariacica, Reserva Biológica Duas Bocas; 20°16′40″S, 040°31′30″W; 525 m elev.; 22.VII.2008; R. Goldenberg et al. 1223 leg.; UPCB 63765.

Distribution. *Henriettea glabra* is endemic to Brazil, occurring in the Atlantic Rainforest from Bahia to Espírito Santo, Rio de Janeiro, São Paulo, and Santa Catarina (Brito 2020). In Paraná, we collected this species in the mountainous region of the Atlantic coast from 50 to 400 m a.s.l. (Fig. 6). These new records in Paraná eliminate the distribution gap of this species, as it was already reported from Santa Catarina (Meyer et al. 2012).

Phenology. It has been collected with flowers in December–February and with fruits in June (Martins 2009). In Paraná, we collected this species with flower buds in November, flowers in January, and immature fruits in March, April, and May.

***Virola gardneri* (A.DC.) Warb.**, Nova acta Academiae Caesareae Leopoldino-Carolinae Germanicae Naturae Curiosorum 68: 495. 1856.
Figure 7. Iconography: Rodrigues (1980, 2002).

New records. BRAZIL – **Paraná** • Guaraqueçaba, morro próximo à cidade; 25°16′52″S, 048°18′42″W; 193 m elev.; 10.X.2019; M.L. Brotto and E. Barboza 3751 leg.; MBM 425072.

Identification. Trees, up to 40 m tall. Bark light yellowish brown, flaky, flakes adherent, irregular, woody, patchy in color by the dehiscence of old rhytidome plates; slash reddish yellow, tangential section with ripple marks, with abundant red latex. Branches when young puberulous, then glabrous. Leaves simple, alternate, distichous, entire, without stipule; petioles (0.8–)1.5–1.8 cm long, canaliculate, puberulous or glabrous; lamina 8.0–18.0 × 4.3–7.0 cm, coriaceous, glabrous, oblong or elliptic-oblong, apex acute to acuminate, base decurrent, adaxial surface with primary vein flat, secondary veins slightly raised, abaxial surface with primary vein raised, secondary veins slightly raised, 10–22 pars, venation pattern brochidodromous. Male inflorescences 1.5–3.5 cm long, fasciculus with 3–10 flowers, axillary and extra-axillary, puberulous, bracts inconspicuous, deciduous. Male flowers with pedicels ca. 2 mm long, perigone 1.8–2.3 mm long, 3–lobed, stamens three, 1.5–1.8 mm long, androphore 0.6–0.8 mm long, anthers 0.7–1.0 mm long, adnata to the apex, obtuse. Female inflorescences 1.5–3.5 cm long, fasciculus with 2–7 flowers. Female flowers with pedicels ca. 3 mm long, ovary puberulous, stylus 0.7 mm long. Fruits ca. 3 × 2.2 cm, ellipsoid or subglobose-ellipsoid, glabrous, apex rounded or slightly apex, base stipulated 2–4 mm long, pericarp rough, seed ellipsoid ca. 2.0 × 1.7 cm, aril laciniate.

Virola bicuhyba (Schott) Warb. was the only species of Myristicaceae recorded for Paraná (Hatschbach 1972; Oliveira 2020). *Virola gardneri* differs from it by the leaves wider, length × width ratio of 1.8–2.6 × 1 (vs. 4.6–5.7 × 1 in *V. bicuhyba*), oblong or elliptic-oblong (vs. linear-oblong or lanceolate-oblong in *V. bicuhyba*), with 10–22 pairs of veins (vs. 23–35 pairs in *V. bicuhyba*). Also, *V. gardneri* differs from *V. bicuhyba* by the flaky and light yellowish-brown bark with a pattern of different color areas resulted by the peeling off of the flakes, whereas the latter species has fissured and gray bark, without detachment. The description of inflorescences and flowers was based on Rodrigues (2002). The more slender trunks have a distinct rhytidome (tree 13 m tall: brown and fissured longitudinally external bark).

Additional examined specimens. BRAZIL – **São Paulo** • Cananéia, Ilha do Cardoso, praia de Ipanema; 06.III.1985; F. de Barros 1052 leg.; MBM 314728 • Ibid.; 04.XII.1985; F. de Barros 1223 leg.; MBM 314727 • Pariquera-Açu, Estação Experimental do Instituto Agronômico; 24°36′30″S, 047°52′37″W; 01.X.1995; N.M. Ivanauskas 473 leg.; MBM 269236.

Distribution. *Virola gardneri* was known from Pernambuco to the southern coast of São Paulo (Rodrigues 2002; Oliveira 2020). In Paraná it was found in the northern portion of the Atlantic Rainforest (Figure 8).

Phenology. Rodrigues (2002) mentioned flowers in October to December, with fruits from August to March of the following year. We recorded almost mature fruits in September.

Discussion

These new records suggest that the number of species in Paraná, and other states in Brazil, is likely to increase, as more areas are systematically explored.

The number of species effectively protected within natural reserves in Paraná is unknown, which prevents a precise evaluation of their conservation status within the state. As a comparison, the neighboring state of São Paulo has a checklist of endangered flora comprising 1086 species (Mamede et al. 2007), 308 (28%) of which are not recorded from any protected area (Colli-Silva et al. 2016). A study like this has not yet been made for Paraná. The last checklist of endangered species in was published over 25 years ago, but without documenting which species occurred in which protected areas (Hatschbach and Ziller 1995).

Two species recorded here, *Cryptocarya botelhensis* and *Virola gardneri*, were collected from outside protected areas, whereas *Cinnamodendron occhionianum* and *Henriettea glabra* were recorded in a public natural reserve (Parque Estadual das Lauráceas) and in a private natural reserve (RPPN Salto Morato). All were found in the municipality of Guaraqueçaba, but the old samples of

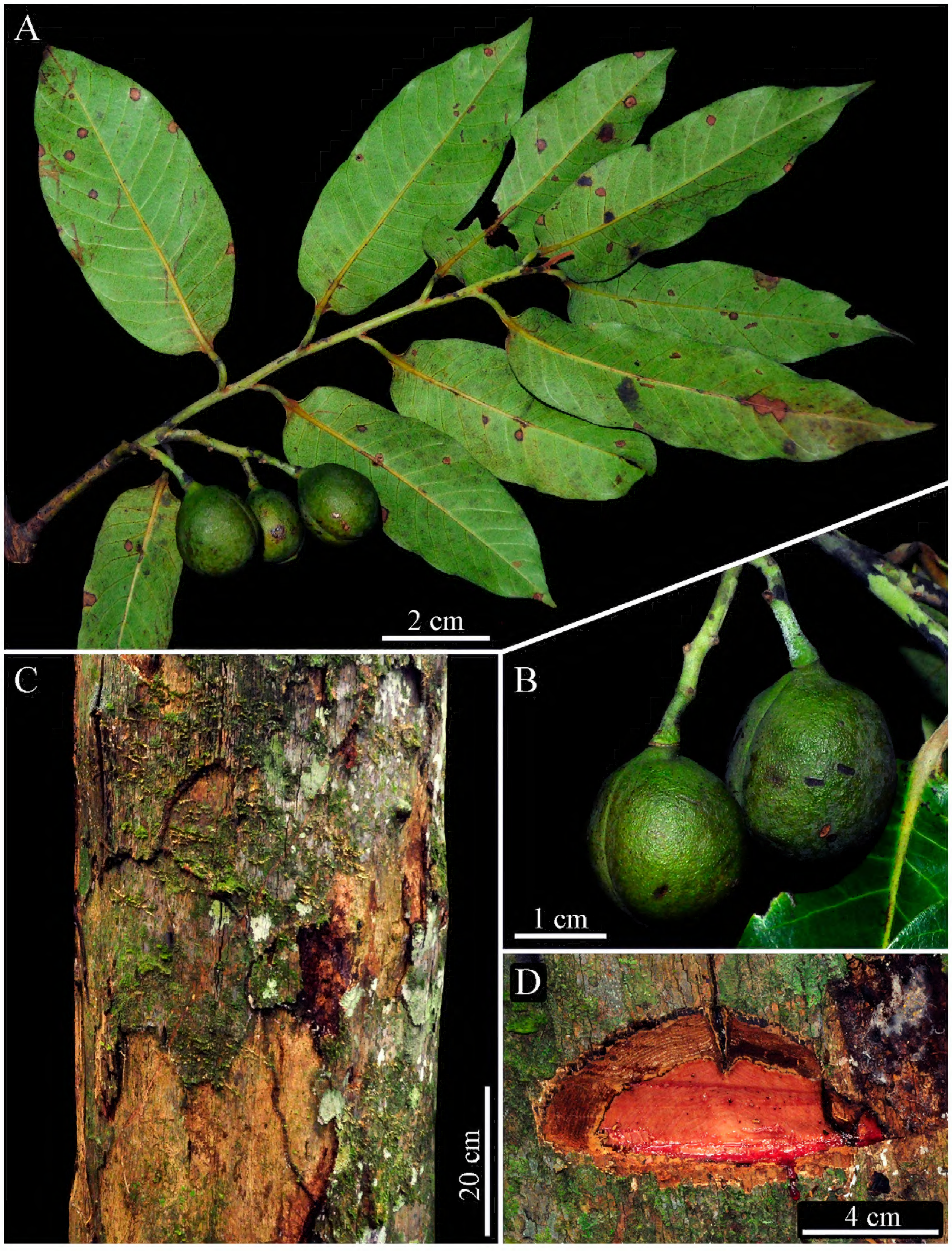

Figure 7. *Virola gardneri* (A DC.) Warb. **A.** Branch with immature fruits and abaxial leaves surface. **B.** Immature fruits in the final stage of development. **C.** Bark appearance. **D.** Slash appearance.

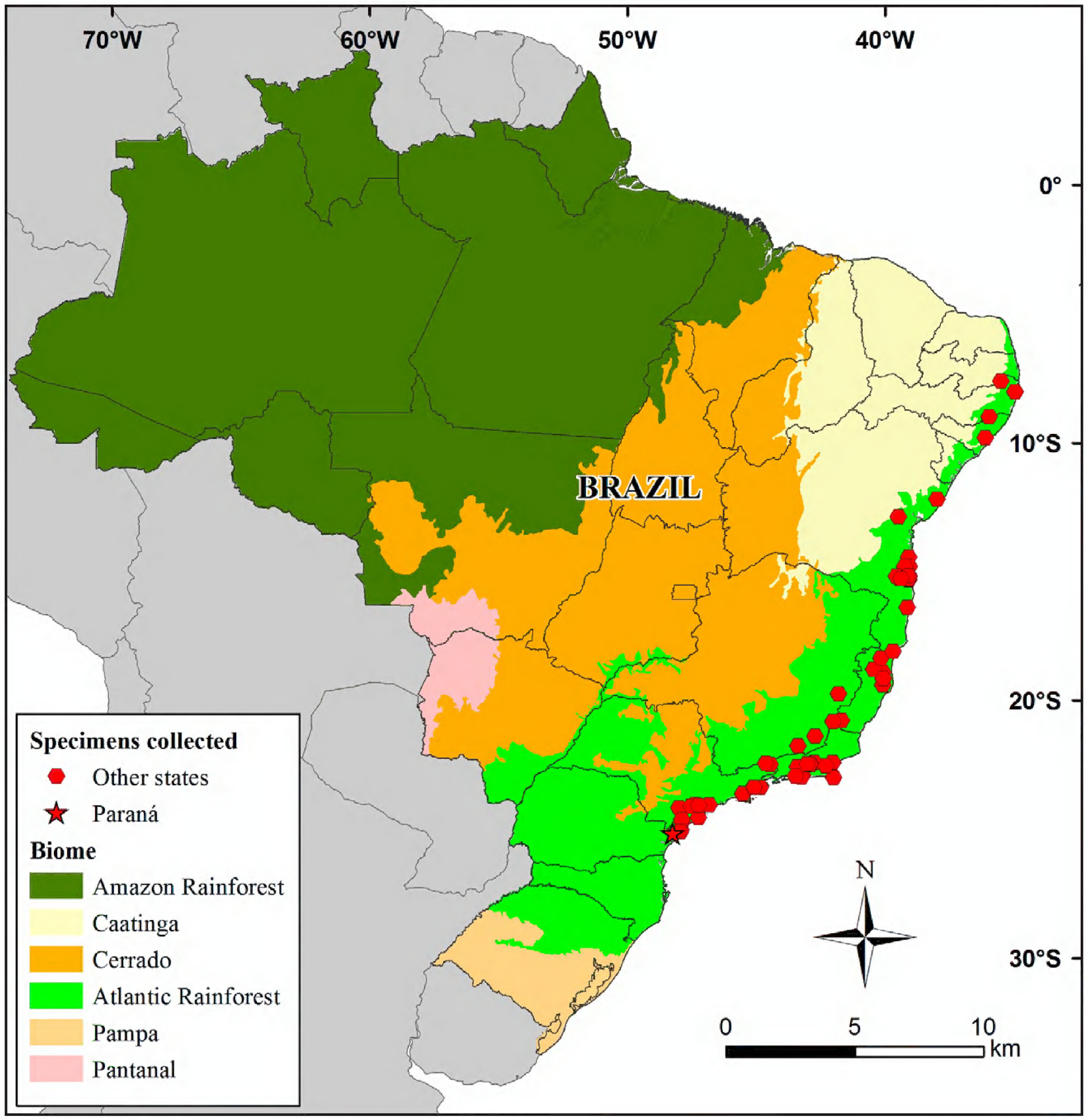

Figure 8. Distribution of *Virola gardneri* (A.DC.) Warb.

C. occhionianum show that it was also present in Adrianópolis and Antonina, whereas *H. glabra* is also found in Matinhos.

Cryptocarya botelhensis was recorded from "Area 1" (Brotto et al. 2019), the region already considered to be a priority for the conservation of Lauraceae in Paraná. This record increases to 67 the number of Lauraceae species in this area, which harbors 87% of the species of Lauraceae in Paraná, joined in only 7.6% of its territory.

The finding of four new records of trees in the Atlantic Rainforest of Paraná highlights the importance of financial support for botanical expeditions, especially in poorly explored regions in the Atlantic Rainforest *sensu stricto*. Because some of these species are rare and narrow endemics, knowing whether they are effectively protected within natural reserves is necessary.

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Authors' Contributions

MLB and RRV collected and photographed the plants, identified the specimens, described the species, and wrote the manuscript. MLB produced the figures, and RRV produced the maps.

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